

# Functional Analysis of *Telajakan* Plants and Space in Northern Denpasar, Bali, Indonesia

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## Abstract

Bali Island, Indonesia, is undergoing rapid land use changes owing to tourism-related development and urbanization. Consequently, urban green spaces, which provide a myriad of benefits to residents, are disappearing and deteriorating. Focusing on *telajakan*, a strip of traditional green space between the frontal wall of a housing compound and a ditch/pedestrian path in a roadside, the study aims: 1) to investigate and document the changes that are occurring with regards to *telajakan* in Denpasar, Bali and 2) to evaluate the functions of the plantings in *telajakan*. The research methods include literature review on traditional green spaces in Bali, vegetation survey at a lot scale, and homeowner interviews with the help of local experts. The study found that: 1) aesthetics, economics, and rituals are the top three functions provided by the *telajakan* plants with aesthetic function being by far the most provided function; 2) species diversity does not correspond with functional diversity; and 3) *telajakan* space itself is often minimized or sometimes lost completely for more inner, privatized space or for vehicle parking lot for shop owners. Since *telajakan* is an important component of traditional Balinese architecture, its loss, degradation, and marginalization necessarily lead to the loss of Balinese culture and identity. This study hints, however, a new form of social interaction through aesthetically-pleasing *telajakan*. Also, functional diversity, which is arguably as important as species diversity, can be maintained by carefully selecting indigenous species with multiple functions.

## Keywords

*Telajakan*, Bali, Urban Green Spaces

## 1. Introduction

Urban green spaces provide many benefits to residents such as beautification, air and water pollutant removal, buffer to noise, shade, and remediation to the urban heat island effect. In the island of Bali, Indonesia, there are two types of traditional green spaces called *natah* and *telajakan* by the locals [1]. We have focused on *telajakan*, traditional green spaces in the southern urban areas in Bali, Indonesia. *Telajakan* is located between the frontal wall of a housing compound and a ditch/pedestrian path in a roadside. The width of *telajakan* is determined by Balinese traditional architecture, which cases between 1.0 and 2.2 meters, and by Bali Regulation No. 10/1999, which cases between 0.5 and 2.0 meters [1], [2]. In the past, the planted species in *telajakan* were used mostly for ritual purposes. The plantings provided plant and flower materials for Balinese daily rituals (offering to the gods).

Recently *telajakan* is being lost under rapid urbanization, and the plantings in *telajakan* are changing in terms of their functions, types, and dimensions. However, since *telajakan* has always been an element of traditional southern Balinese architecture, local people pay little attention to the changes that are occurring and few scientific studies have been conducted on *telajakan*. Therefore, the objectives of this study are: 1) to investigate and document the changes that are occurring with regards to *telajakan* in Denpasar, Bali and 2) to evaluate the functions of *telajakan* plants.

## 2. Preceding Studies

To our knowledge, almost no ecological analysis of *telajakan* exists; very little data on the plantings in *telajakan* is available or has been published in English. There are, however, some preceding studies on urban green spaces in Bali. Cultural and historical studies of *telajakan* do exist, including Yudiantini (2012) whom argues that *telajakan* has helped form the identity of the Balinese on the traditional village landscape in Bali [1]. *Telajakan* also has spiritual meaning for the Balinese to protect homeowners from invisible dangers [2]. Putra *et al.* (2013) illustrate the transformation of the traditional Balinese house for tourist facilities, and documented the process of marketization and re-embedding of the traditional elements adjusted for the modern context [3]. Brata (2014) examined the process of commodification of *telajakan* in Ubud Village, concluding that the *telajakan*'s value as traditional green open space is neglected, resulting in ecological damage and the extinction of the aesthetics of the Balinese architecture, and witnessing the destruction of the Balinese identity [4].

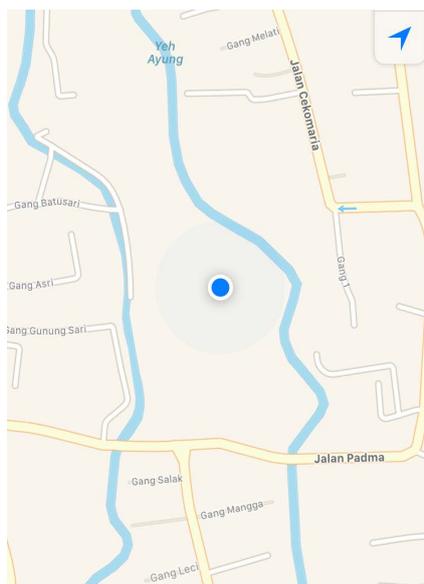
With regards to the functions of *telajakan*, literature review shows that the primary functions of traditional plants in *telajakan* are religious and economic. The plants are used for religious ceremonies, medicinal purposes, spice, aesthetics, and micro economy [5]. *Telajakan* provides a space to place the *penjor* during traditional ceremonies [1]. The purposes of *telajakan* space are aesthetic, safety, social and spiritual—for example, greening, widening the view distance,

keeping and defending the building boundary for safety and building comfort, and providing intimacy and identify of neighborhoods [1]. Although every *telajakan* is owned, provided, and maintained by the household, its use is characterized by semi-public nature [2]. *Telajakan* used to provide a place for communication with neighbors, and used to be a place for street vendors and wagon stops [2]. However, a frontal wall as well as *telajakan* is being lost as owners transform the space, accommodating tourism and changing lifestyles [1], [6].

### 3. Methods

Bantas village (see **Figure 1** for location) in northern Denpasar was chosen after the consultation with Dr. Ngakan Ketut Acwin Dwijendra of University of Udayana, an expert of *telajakan* from the viewpoint of traditional Balinese architecture [2]. Also, earlier research found that Bantas village is a frequent winner of the citywide *telajakan* competition (see [7]).

In the village, the authors observed the *telajakan*, took photos, and interviewed the owner who operates a convenience shop on the 31st of August, 2017. Six *telajakan* samples were chosen among the houses that face the main street (**Figure 2**). To determine a general trend, every other house on both sides of the street was selected. At each *telajakan*, vegetation survey was conducted and the width of the *telajakan* was measured. Using Keng (1978) and Periplus Editions (1999) as references, all the plantings in each *telajakan* were identified and their functions were determined [8], [9]. The functions provided by the plantings include aesthetic, economic, ritual, shade, medicinal, protection from intrusion, anti-mosquito, biofungicide, and crops. Also, for each species, its number was counted. When too many individual species were present like a ground cover, experts estimated the number of individuals by counting the number of individuals in a limited area and multiplying the number by the area.



**Figure 1.** Location of Banjar Bantas (Apple Maps).



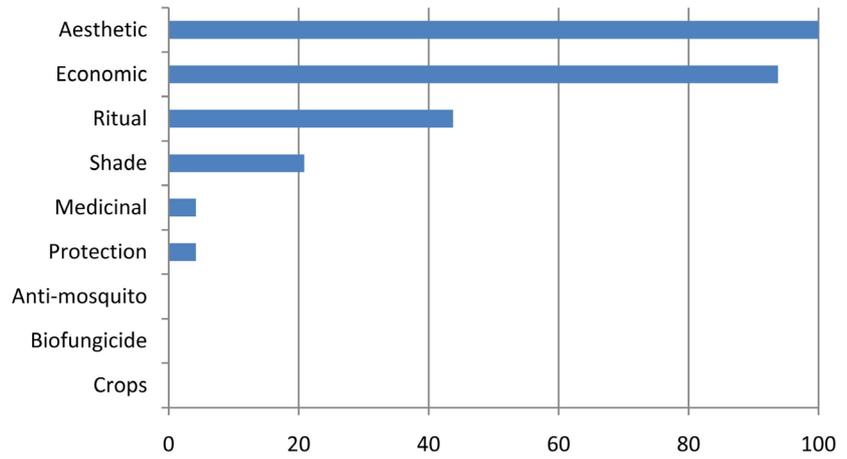
**Figure 2.** View of the main street from the south.

The data of each *telajakan* were tabulated into a table with a scientific name of each species, the number of individuals, and the functions provided by the plantings. Based on the table, two types of figures were created. Both types of figures show that for each function how much of the species present provides the particular function. The difference is that **Figures 3-8** take the number of individuals into account. For example, if the percentage is 80, 80% of all the plants in Sample X, considering the number of individuals, provide the particular function such as the aesthetic function.

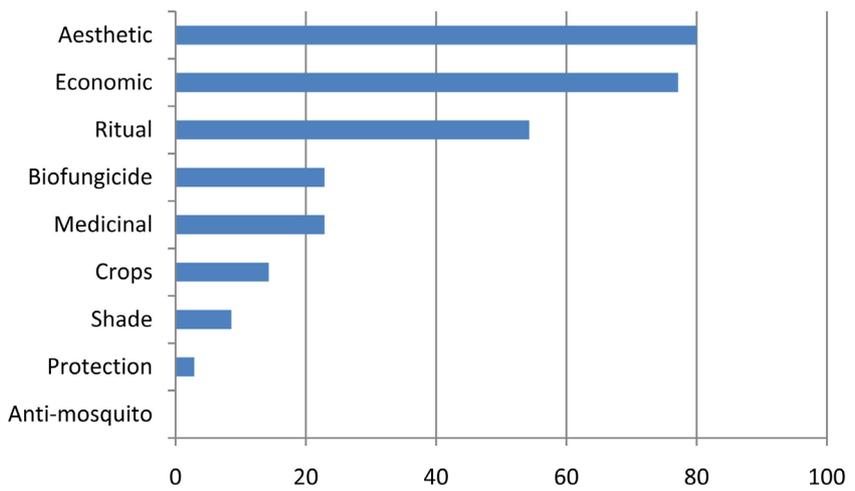
#### 4. Results

For all six samples, aesthetics, economics, and rituals are the three most important functions which the planted vegetation has (**Figures 3-8**). Aesthetic function is by far the most provided function by the planted species with 93.6% on average, followed by economic function with 55.9%. In terms of the percentage of functions provided by the plants, Samples 1 - 3 and 5 have a similar trend; Samples 4 and 6 have the same trend.

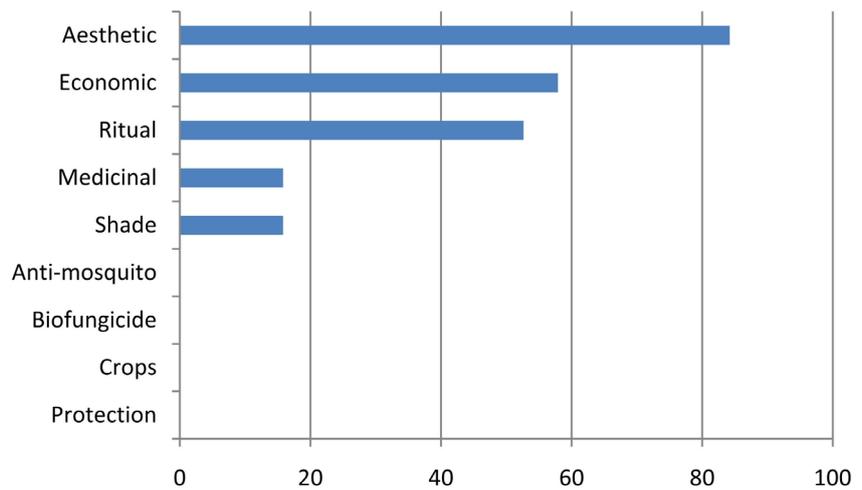
Examining each sample in order, Samples 1 and 2 have the same trend (**Figure 3** and **Figure 4**). Aesthetic function is provided by most of the plants, followed closely by economic function. Far behind third is ritual function. For Sample 3 (**Figure 5**), the order is the same (aesthetics first, economics second, and rituals third) but the difference between aesthetics and economics is larger and the difference between economics and rituals is smaller than Samples 1 and 2. For Sample 4 (**Figure 6**), the result is very different from Samples 1 - 3 due to three abundant species with only aesthetic function: *Cuphea hyssopifolia*, *Alternanthera ficoidea*, and *Ruellia malacosperma*. Both economic and ritual



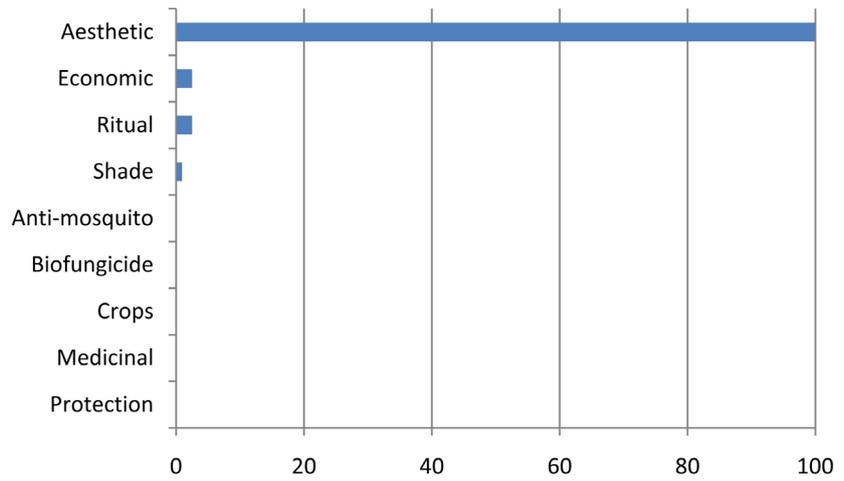
**Figure 3.** Percentage of functions provided by the plants considering the number of individuals in Sample 1.



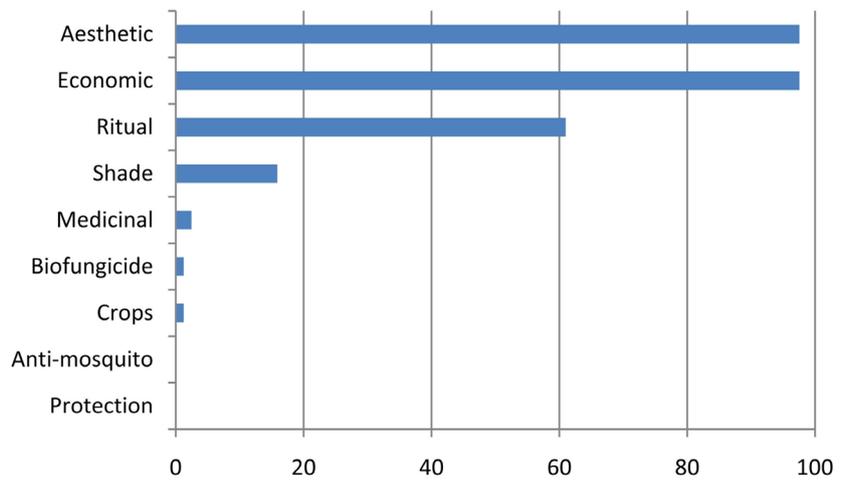
**Figure 4.** Percentage of functions provided by the plants considering the number of individuals in Sample 2.



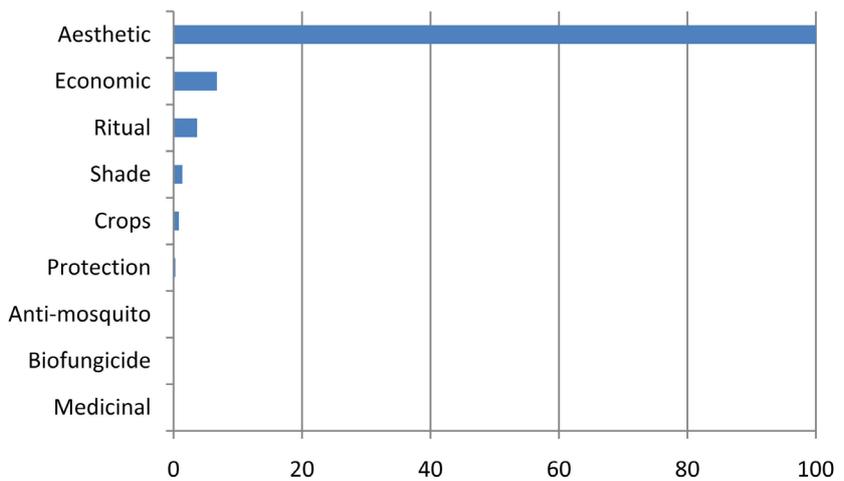
**Figure 5.** Percentage of functions provided by the plants considering the number of individuals in Sample 3.



**Figure 6.** Percentage of functions provided by the plants considering the number of individuals in Sample 4.



**Figure 7.** Percentage of functions provided by the plants considering the number of individuals in Sample 5.



**Figure 8.** Percentage of functions provided by the plants considering the number of individuals in Sample 6.

functions have very small share (2.5%). Sample 5 (Figure 7) is very similar to Sample 1. Aesthetics and economics have the same percentage of 97.6%; ritual function is the third most common function with 61%. Finally, Sample 6 has exactly the same trend as Sample 4. Aesthetic function is by far the most common function; actually 100% of the species planted provide this function. Economic and ritual functions are distant second and third, respectively. The sheer number of three species, the same three species as in Sample 4, with only aesthetic function has a very large effect on the appearance of the resulting graph (Figure 8).

The highest percentage of shade function is provided by the plants in Sample 1 with 20.8%, followed by Sample 5. Examples of plants with shade function are *Plumeria acumunata* and *Rhapis excelsa*. The highest percentage of medicinal function is provided by the plants in Sample 2 with 22.9%, followed by Sample 3. Examples of plants with medicinal function include *Aloe vera* and *Erythrina variegata*. Protection means protection from intrusion. For example, *Opuntia* spp. are plants with protection function.

In terms of total number of different species, Sample 6 has the most number of species (most species diverse). 19 species are identified in Sample 6, followed by 13 species in Sample 5, and 12 species in Sample 1 (Table 1). The top three and its order remains the same, considering the number of cultivars. As for the width of *telajakan*, Sample 3 is the narrowest with 159 cm; Sample 1 is the widest with 470 cm (Table 1). Though the sample size is small, there is no apparent relationship between the species diversity and *telajakan* width.

## 5. Discussion

Reflected on the number of each species including cultivars on the analysis, the kind of plant functions favored by the local residents (*i.e.*, owners) was clearly revealed. Based on the result of vegetation survey, we can conclude that aesthetics, economics, and rituals are the three most favored functions by the *telajakan* (home) owners. Among the three functions, aesthetic function is by far the most popular function. This is evident in the planting of species with only aesthetic function such as *Cuphea hyssopifolia*, *Alternanthera ficoidea*, and *Ruellia malacoperma*—plants with colorful flowers and leaves. Also, some gardens are well maintained with trimmed branches and leaves (Figure 9).

Previous study [7] found a similar trend in terms of the plant functions favored in another village in northern Denpasar with bonsai trees and manicured vegetation with grounds being swept well. Kato *et al.* (2017) pointed out that

**Table 1.** The number of species in each sample and *telajakan* width.

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
Num of species	12	10	7	10	13	19
Num of species including cultivars	16	11	9	11	18	23
Telajakan width (cm)	470	428	159	160	255	170



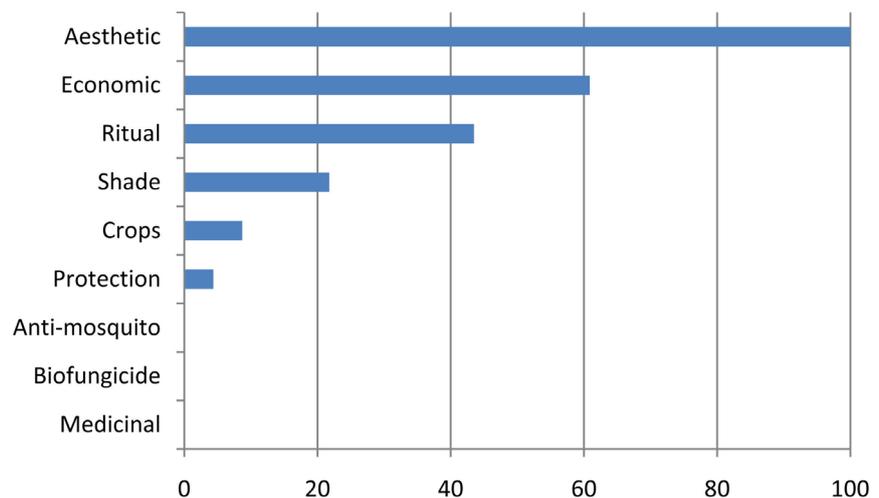
**Figure 9.** Aesthetically-pleasing *telajakan*.

manicured *telajakan* with plants with colorful flowers and leaves, lolly-pop trees, and exotic species has become a status symbol of the owner, giving new meaning to *telajakan* [7]. The fact that both villages are regular winners of the *telajakan* competition (public hygiene and removal of mosquito habitats) underscores the importance of aesthetics to the scenery of the street. The popularity of aesthetic function in Br. Bantas corroborates the findings of the earlier study.

Although **Figure 6** of Sample 4 and **Figure 8** of Sample 6 may appear rather peculiar, considering the number of individuals, these graphs represent well the actual appearance of *telajakan* and the occupancy of each function. Comparing the two figures (**Figure 8** and **Figure 10**) of Sample 6, both rightly express the percentage of functions provided by the plants in Sample 6. The difference is that **Figure 8** takes the number of individuals of each species into account whereas, **Figure 10** does not. Doing so gives the graph individual number-weighted percentage of functions, a “feel” close to the field observation. The reasoning behind this representation such as **Figure 8** is that if an owner values a particular function, s/he would plant more of these species.

In terms of the number of functions provided by the plants, Sample 2 is the most diverse with eight functions, followed by Sample 5 with seven functions. This result does not correspond with the number of species present (*i.e.*, species diversity). Therefore, in terms of managing for functional diversity, it is inferred that even when an owner cannot afford to plant many different species, s/he can diversify the number of functions provided by the plants by carefully selecting those species with multiple functions such as *Plumeria acumunata*, *Aloe vera*, and *Azadirachta indica*.

Traditionally *telajakan* has multiple functions such as provision of plant and flower materials for Balinese daily rituals, greening and building comfort, and



**Figure 10.** Percentage of functions provided by the plants *without* considering the number of individuals in Sample 6.

offering semi-public space for street vendors and neighbors. However, the results show that only a couple of functions is strongly favored, focusing on aesthetic and economic aspects. Although ritual function is the third most common function provided by the planted species, the importance of this function seems to be taken over by aesthetics, for people buy an offering set from a store for daily rituals and do not harvest leaves and flowers daily, as they used to do, at least in the city. For bigger Hindu festivals, some people still use their own plants to prepare offerings. Anecdotally, we heard a story that neighbors ask an owner for permission to pick some flowers for daily offerings or bigger village festivals—note, public use of *telajakan* plants that are privately owned and maintained. This is when conversation between the owner and the neighbor is born. Also, when an owner has a traditional *telajakan* with beautiful flowers, neighbors sometimes take pictures to post to Instagram. This kind of use of *telajakan* may hint a new, modern social interaction via *telajakan*.

Finally, although the results are based on a fairly representative *telajakan* survey as described in the methods section, the samples were not chosen randomly and the number of samples is small. To draw a more comprehensive conclusion, it is necessary to collect more evidence by expanding the locations where *telajakan* is surveyed, such as including the villages in other parts of Denpasar and of different socioeconomic status, and by evaluating the plant data as well as socioeconomic data.

## 6. Conclusion

Although literature review shows that *telajakan* is an important element in the traditional village landscape in Bali, urbanization and privatization threaten the existence of *telajakan* and change its species composition. Now there are fewer *telajakan* plants with religious function and more species with aesthetic function—many of them being exotic ornamental plants. This study suggests, how-

ever, that functional diversity can be maintained by carefully selecting indigenous species with multiple functions. New form of social interaction is also born via aesthetically-pleasing *telajakan* through neighbors and passers-by taking photos of *telajakan* and posting them to social networking service.

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### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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